

Recent Advances in the Treatment of Surgical Emergencies

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ADVANCES IN THE MANAGEMENT of surgical emergencies are dependent upon gains in our knowledge concerning the basic physiologic mechanisms of shock, hemorrhage and infection. The present review will attempt to correlate the progress made in these fields during 1963 with recent developments in clinical surgery.

Shock and Hemorrhage

Tremendous gains have been made in our understanding of the basic physiology of shock and hemorrhage. Although shock differs in experimental animals and humans, many common denominators have been found. The obvious limitations in a controlled study of human shock make it mandatory that we look carefully at the results of experimental studies in laboratory animals.

Hardaway⁴⁵ presented an exciting, unified concept of the pathophysiology of various types of shock states. According to him the essential factor in all types of shock is disseminated intravascular coagulation, a process which may be prevented by fibrinolysin. During reversible shock, intracapillary thrombi form but are dissolved by endogenous fibrinolysin whereas irreversibility is characterized by progressive disseminated intravascular coagulation. This fascinating concept needs further study in the human subject, especially since case reports

of ischemic necrosis of several organs in prolonged human shock are beginning to appear in the literature.⁴¹

The importance of the microcirculation in shock is further emphasized by the work of Robb⁸⁴ who observed platelet microembolism in animals during several types of experimental shock. Norepinephrine accentuates the sludging effects of oligemic shock⁹¹ but low-molecular-weight dextran is able to maintain the microcirculation and prevent tissue oxygen debt and death.⁶³ Bergentz and coworkers¹² have shown in humans that tissue injury is followed by a significant increase in the viscosity of whole blood. I believe that eventually norepinephrine and other vasopressor agents will no longer be used in the treatment of human shock although low-molecular-weight dextran may prove to have great value and should be investigated further.

Palmerio and coworkers,⁸⁰ on the basis of long-term studies in the laboratory of Jacob Fine, have proposed that the detoxifying properties of the reticuloendothelial system are damaged by ischemia during shock. They point out that the detoxification of endotoxin, whether absorbed from the intestine during hemorrhagic hypotension or derived from an established gram-negative infection, is thus seriously hampered. It is postulated that the unchallenged endotoxins damage the abdominal viscera, especially the intestine and liver, whose integrity is essential for normal reactivity of the peripheral vessels. These investigators further suggest that

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celiac blockade relieves vasoconstriction in the area where tissue damage threatens survival, that is, the splanchnic circulation, and should therefore be more effective than antiadrenergic agents whose site of activity is less selective. Vick and coworkers¹¹⁶ demonstrated the beneficial effects of Dibenzylamine® (phenoxybenzamine hydrochloride) in endotoxic shock. Certainly neither celiac blockade nor Dibenzylamine is advocated until adequate restoration of blood volume and extracellular fluid has been accomplished. Simeone⁹⁶ pointed out that caution should be used in the extrapolation of animal experiments to human shock, especially when it is not associated with infection.

Hayasaka and coworkers⁴⁷ demonstrated the protective effects of aldosterone on endotoxin shock in cats. Although the mechanism of action of this agent is unclear, it is of interest that hydrocortisone has been used in large doses by Lillihai and his group in the treatment of endotoxic shock. The use of Tris buffer has been studied by two groups, but with differing results, and further investigation is required.^{38,77} Wolfman and coworkers¹²³ confirmed the work of Shires and his group on the importance of isotonic saline solution in the treatment of hemorrhagic shock.

Two interesting studies were carried out on the effects of alcoholic intoxication on the response to acute hemorrhage in dogs.^{37,57} The results of Knott and coworkers⁵⁷ indicated that alcoholic intoxication did not have an untoward effect upon the response to hemorrhagic stress. Gettler and Allbritten³⁷ showed that alcoholic intoxication was deleterious. However, the amount of blood they withdrew was considerably greater than that in the studies by Knott, an experimental difference which may explain the discrepancy in the results.

Lister and coworkers⁶⁵ in an impressive study of transcapillary refilling after hemorrhage in normal man, showed very clearly the deleterious effects of norepinephrine in human shock, because norepinephrine prevents normal hemodilution in the posthemorrhagic period. Angiotensin has been used in the treatment of human hypotensive states by Nassif and coworkers⁷⁶ who showed that this drug was effective when other pressors were not. The effect of angiotensin depends largely on arteriolar constriction in the renal and splanchnic bed. Because of the recently recognized damaging effects of splanchnic ischemia, angiotensin as well as norepinephrine may soon be contraindicated in the treatment of patients with shock.

The value of measuring central venous pressure in shock is becoming ever more apparent and the reader is referred to the work of Hallin,⁴³ and McGowan and Walters⁷¹ for excellent reviews. This measurement will undoubtedly now be used

with ever greater frequency as a monitor for the administration of blood and other fluids in shock.

Cardiac Arrest, Pulmonary Embolism

The problem of closed cardiac resuscitation continues to be investigated.¹²⁰ Yanoff¹²⁴ showed that free-fat pulmonary emboli are common in patients undergoing closed-chest resuscitation, but the significance of these findings is not as yet readily apparent. The excellent study of Boyan and Howland¹⁶ indicated that the incidence of cardiac arrest in patients receiving massive transfusions during radical operation for carcinoma is significantly decreased when cold blood is warmed before administration. This observation certainly bears clinical application. It should also be pointed out that the ACD solution used for the storage of bank blood has a severe acidifying effect on the donor's blood and that during storage further reduction in the pH occurs with the accumulation of lactic acid.⁸⁸ Altemeier and Todd⁴ have pointed out the unexpectedly low incidence of 4.655 per cent of postoperative wound infection after open cardiac resuscitation and emphasize the need for more basic exploration into the reasons for this low rate of infection under less than ideal conditions. Thaler and Stobie¹⁰⁹ have made a significant contribution to reducing the complications of hepatic injury in children undergoing external cardiac compression. The technique they suggest for infants and young children consists of compressing the *mid-sternum* with superimposed thumbs while the fingers are linked behind the patient for additional support.

Pulmonary embolectomy is slowly beginning to play an important role in the treatment of thromboembolism. Donaldson and coworkers,²⁸ in a retrospective study, found that approximately one-fifth of the patients dying from pulmonary embolism survive long enough to permit operative treatment with the aid of a pump oxygenator. It is generally agreed that a planned operative procedure with cardiopulmonary by-pass is preferable to the traditional Trendelenburg operation.^{7,25,28,106} Most reports recommend either ligation or plication of the inferior vena cava after removal of the emboli.^{7,90,106} Venous angiography may be of great aid in the diagnosis of this condition.^{106,121}

Esophagus, Stomach and Duodenum

Britton and Crile¹⁸ have reported a follow-up study of their experience with transesophageal ligation of bleeding esophageal varices. Bleeding recurred in four of fourteen patients with extrahepatic block and in four of eight of the survivors with cirrhosis of the liver. They concluded that transesophageal ligation was most effective in con-

trolling hemorrhage from varices limited to the distal third of the esophagus. I believe that the results reported by Britton and Crile do not lend much support to this method of therapy. Orloff and Thomas⁷⁹ studied the cardioesophageal area grossly and microscopically in 20 unselected patients with variceal hemorrhage during the course of transesophageal varix ligations. They were able to find evidence of esophagitis in only one of the 20 patients, which confirms the thesis of Leibowitz that factors other than esophagitis are important in the pathogenesis of ruptured esophageal varices. Studies on rupture of the esophagus are continuing and indicate that early therapy with wide drainage and maintenance of adequate nutrition during the prolonged convalescence is of extreme importance.¹¹⁵

Strahan¹⁰⁷ described an interesting and potentially valuable method of repairing a previously established esophageal fistula with Eastman 910 adhesive, but further studies are necessary before it can be applied to humans. Hays and Snyder⁴⁸ indicated that in premature infants with tracheoesophageal fistula, rupture of the anastomosis is associated with a far lower mortality rate when an extrapleural approach is used.

Caustic burns of the esophagus continue to be an exceedingly difficult problem. Cleveland and co-workers²³ showed that in children with lye burns of the esophagus, esophagoscopy performed soon after the lye has been swallowed is safe and even essential to diagnosis and management.

Jordan, DeBakey and Cooley⁵⁶ reviewed their experiences with resection in the management of acute gastroduodenal perforation and reported an over-all mortality rate of 2 per cent. A degree of selectivity was present in this series, however, because of such contraindications to operation as generalized purulent peritonitis, localized abscesses around the duodenum, shock and associated systemic diseases. Royster and associates⁸⁶ pointed out that a definitive operation should be performed more frequently for acute perforated peptic ulcer. In a follow-up study of 86 cases of simple closure, 30 per cent of the patients required a secondary definitive operation, 31 per cent were symptomatic and only 27 per cent were asymptomatic. No follow-up studies were possible in 12 per cent of the patients. No deaths occurred in a group of patients reported by Harvey⁴⁶ who were especially selected for resection during acute perforation. Howard and Singh⁵² found that in 58 of 59 patients with perforated peptic ulcer the peritoneal fluid had an alkaline pH. This fact is of great importance when analysis of paracentesis fluid is being made in patients with acute abdominal catastrophes and is

certainly in contrast to general opinion. Instillation of 300 to 500 ml of air into the stomach may be of value in the diagnosis of perforated gastroduodenal ulcers but a larger series than the 24 cases reported by Henelt and coworkers⁴⁹ is necessary before this measure is put to general use.

Kozoll and Meyer reviewed the histories of 2,008 patients with massively bleeding gastroduodenal ulcers seen at the Cook County Hospital.⁵⁸⁻⁶⁰ Radiologic studies taken after the bleeding had stopped revealed the bleeding site in more than 75 per cent of the cases. The mortality rate for duodenal ulcer was 13.8 per cent, and for gastric ulcer, 30.8 per cent. The mortality rate steadily increased as the age of the patients rose. Starzl and Sanders¹⁰⁴ described a useful maneuver to detect the site of gastric hemorrhage; the gastrocolic omentum is divided and the stomach is inverted along the greater curvature with a sponge forceps to allow visualization of the entire inner aspect of the stomach.

Foster, Hickok and Dunphy,³³ in a provocative study of 178 cases of massive upper gastrointestinal hemorrhage, showed the importance of advancing age and concomitant diseases in increasing the mortality rates. The use of pyloroplasty and vagotomy for the emergency control of massive upper gastrointestinal hemorrhage, especially in patients whose massive hemorrhage began during hospitalization for other conditions, has been forced upon the authors by the unacceptably high mortality rate following emergency gastric resection. No mortalities occurred in seven patients undergoing pyloroplasty and vagotomy. Expansion of this series to larger numbers of cases is indicated and necessary. In contradistinction, Akin and Sullivan¹ indicated a very high incidence of complications, especially postoperative recurrent bleeding, in a series of 20 cases of pyloroplasty and vagotomy for emergency hemorrhage, and they cautioned against use of the procedure. In my estimation, some of these differences of opinion can be resolved by more careful attention to and description of the type of ulceration being treated by pyloroplasty and vagotomy. The deleterious effect of associated conditions in the patient with massive gastrointestinal hemorrhage is further emphasized by the report of Cammock and coworkers.²¹ It is generally agreed that gastric cooling (not freezing) is useful in the management of massive upper gastrointestinal hemorrhage.^{73,114,118} Although gastric hypothermia is not completely successful in all types of hemorrhage, good results can be achieved in esophageal varices and duodenal, gastric, and marginal ulcers. Less satisfactory responses are seen in postoperative hemorrhage and hemorrhage from stress or steroid-induced ulcers.

The complications of gastric resection received continuing study. Blomquist¹⁴ very clearly described the mechanism of obstruction of the afferent loop following gastric resection. Many reports have appeared recently concerning the development of phytobezoars in patients who have had gastrectomy.⁶⁹ Citrus fruits, especially orange pulp, have been implicated as a very important cause of bowel obstruction in such patients. Thompson¹¹¹ reported four cases of ischemic necrosis of the proximal gastric remnant following subtotal gastrectomy; he concluded that subtotal gastrectomy, with ligation of the left gastric artery at its origin, splenectomy and removal of the short gastric arteries, is a procedure of great risk. The usual area of necrosis occurs along the greater curvature of the stomach and the mortality rate is exceedingly high.

The mechanism of so-called spontaneous rupture of the stomach has been reviewed thoroughly by two groups of investigators^{2,26} and the recognition of such an entity by surgeons is becoming increasingly evident. Jones and Joergenson⁵⁵ advocated the use of a Roux-en-Y patch type of anastomosis of jejunum to the side of the duodenum to cover large duodenal defects. This interesting and important technique may see much further use, particularly in the extremely difficult treatment of the lateral duodenal fistula.

Liver, Biliary Tract and Pancreas

The extremely high mortality rate of hepatic injuries⁹² has led to careful studies of the management of hepatic trauma. Two relatively new principles have been introduced that may improve the results of therapy in this devastating condition. Merendino and coworkers⁷² proposed drainage of the common bile duct in the management of trauma to the liver, believing that it may decrease the incidence of subphrenic abscess and accumulation of bile after massive hepatic trauma. Poulos⁸² suggested the value of resection of massively damaged segments of liver and expressed belief that this will become an important method of debridement of the liver when huge segments of it are irreparably damaged. The increased number of reports of traumatic hemobilia is testimony to the fact that hepatic trauma and its sequelae need further careful study. This severe complication of hepatic trauma may be diagnosed by preoperative hepatic arteriography or a radioactive rose bengal scan.⁴⁰ Spencer and coworkers¹⁰² reported the value of operative cholangiography in demonstrating the site of the cavity within the liver. Various methods of therapy have been utilized,⁵ including ligation of the right hepatic artery¹⁰¹ and hepatic lobectomy.¹⁰²

Santschi and associates⁸⁹ reported four cases of generalized bile peritonitis in adults in which the

complaint was abdominal distention with virtually no abdominal pain, tenderness, fever or leukocytosis. Their article is an extremely important one; I have observed several cases in which the clinician has been lulled into a false sense of security by the lack of findings in the abdomen. Thoren¹¹² has done some very nice experimental work on the basic injurious mechanisms in bile peritonitis. He demonstrated that the surface-active bile salts are probably bound to protein in peritoneal exudate before reabsorption, and therefore do not cause hemolysis when they are absorbed. However, if bile peritonitis is complicated by hemorrhage, hemolysis does occur and resulting renal damage is much greater.

Albo and coworkers³ expressed doubts about the value of the serum amylase determination in the diagnosis of acute pancreatitis. Gambill and Mason³⁵ also experienced disappointments with this test and found that the urinary amylase determination has a far greater accuracy in the presence of acute pancreatitis.

Saidi and Donaldson⁸⁷ reported 24 cases of pancreatitis occurring after 3,018 subtotal distal gastrectomies for duodenal ulcer. The serum amylase again was of remarkably little value in the diagnosis although fever, tachycardia and leukocytosis were always present, a finding also noted by Albo.³ An antiproteolytic substance called Trasylol has been found to improve the mortality rate uniformly in experimental pancreatitis of various types.^{70,78,98} Whether or not this material has value in clinical acute pancreatitis remains to be determined. The same is true for propylthiouracil, which also has been shown to be of value in experimental hemorrhagic pancreatitis.¹¹⁰ Shinowara and coworkers⁹⁴ demonstrated a consistent, pronounced elevation of the thromboplastic plasma component (factor VIII) as well as hyperfibrinogenemia in acute pancreatitis. They suggested that these changes in the blood set the stage for hypercoagulability, a concept which would fit well with Hardaway's suggestion that disseminated intravascular coagulation may be present in acute pancreatitis. Thal and his coworkers¹⁰⁸ found many smooth muscle-stimulating substances in the blood in both experimental and clinical pancreatitis. They expressed belief that these substances most probably represent bradykinin or kallidin. These materials produce extreme vasodilatation and increased permeability when injected into a vascular bed. Trasylol reduces the concentration of these substances in the peripheral blood in both human and experimental pancreatitis.

As in hepatic trauma, a more aggressive approach has been taken toward the treatment of injury to the pancreas. Baker and coworkers⁶ advocated wide exposure of the pancreas through the gastrocolic omentum, debridement of damaged tissue and iden-

tification of the ductal system. Doubilet and Mulholland²⁹ advised sphincterotomy and intubation of the pancreatic duct after severe pancreatic trauma. This principle will probably become more widely accepted in future years.

Abdominal Cavity, Small and Large Intestine

Handelsman and associates⁴⁴ recently stressed the value of a one-layer end-to-end anastomosis with non-absorbable suture material and evacuation of the dilated intestine in the treatment of congenital jejuno-ileal atresia. This method of therapy is apparently coming into wider use, together with resection of the dilated proximal atonic portion of the intestine, although Richardson⁸³ has emphasized the role that enterostomy plays in intestinal obstruction. Perhaps the greatest value of enterostomy lies in the treatment of meconium ileus. An interesting variant of meconium ileus which Cordonnier and Izant²⁴ have called *meconium ileus equivalent*, should be kept in mind when treating older children. This diagnosis is suggested when mechanical intestinal obstruction occurs in a child with known or suspected cystic fibrosis. This entity has been observed in children who have not followed pancreatic substitution therapy faithfully. The Duhamel operation, which is receiving increasing attention in the treatment of Hirschsprung's disease, has recently been utilized successfully in the emergency neonatal treatment of complete aganglionosis of the colon.²⁷

Mason and coworkers⁶⁸ reported the interesting finding of indirect hyperbilirubinemia in infants with malrotation and duodenal bands. This finding has also been described in hypertrophic pyloric stenosis and although the cause is unknown, it would appear that a decreased production of glucuronyl transferase may be related to lack of available glucose caused by starvation. An important type of functional intestinal obstruction in newborn infants was mentioned by Sieber and Girdany.⁹⁵ They described seven infants, five of whom were premature and all of whom had evidence of intestinal obstruction without demonstrable anatomic abnormalities. The clinical course closely resembled that seen in infants with neonatal aganglionosis. The cause for this clinical syndrome is not known. Waldhausen and his coworkers¹¹⁷ described six cases of fulminating necrotizing colitis occurring in infancy which progressed rapidly to perforation of the colon and peritonitis. Infection, especially with pseudomonas, appeared to be the most common etiologic agent. The problem of intussusception has been reviewed by several investigators.^{11,61,81} Of particular interest is the fact pointed out by Kyle

and coworkers⁶¹ that recurrent intussusception following definitive therapy is not nearly so rare as previously thought.

The diagnosis of strangulation obstruction of the small intestine remains a problem. Determinations of serum lactic dehydrogenase activity have not been particularly helpful.⁶² Byrne and Boyd²⁰ showed that the hyperamylasemia of intestinal obstruction may be diminished experimentally by total gastrectomy or by treatment with propantheline bromide (Pro-Banthine®). They suggest that extreme pressure within the duodenum may cause obstruction of the sphincter of Oddi with consequent retrograde flow of pancreatic secretion through venous channels.

Gallstone ileus has been studied by Buetow and Crompton,¹⁹ who found that since 1925 the mortality rate has decreased from 75 per cent to 13.6 per cent. Two separate reports have been made of barium enema reduction of gallstone obturation, an interesting but probably not a frequently applicable method of dealing with this problem.^{74,119} Rothwell-Jackson⁸⁵ described three cases of idiopathic obstruction of the large bowel. This is actually the same entity previously noted by Morton, Schwartz and Gramiak, and is probably better referred to as colonic ileus. It may be associated with a variety of other diseases or may arise *de novo*. The important conclusion reached by Rothwell-Jackson is that operative decompression is occasionally necessary to avoid cecal perforation in the absence of organic obstruction.

A more aggressive attitude is being taken toward treatment of embolic and thrombotic occlusion of the superior mesenteric artery, whether by embolism or thrombolysis. Successful treatment of both types has been described.^{8,17} Certainly the mortality rate of 92.4 per cent reported by Solheim¹⁰⁰ justifies an aggressive approach to this problem. Marston^{66,67} has demonstrated an extremely high rate of loss of plasma following experimental occlusion of the superior mesenteric artery. The importance of massive transfusions of plasma is emphasized. Boley and coworkers¹⁵ reported five cases of vascular occlusion of the colon characterized by abdominal pain and rectal bleeding but few other clinical symptoms or signs. The authors emphasized that the progress of vascular occlusion of the colon cannot be predicted from initial roentgenographic studies, and if symptoms persist surgical intervention is indicated. Hickey and associates⁵¹ advocate a double-barreled ileostomy for the treatment of fulminating ulcerative colitis with colonic wall necrosis. Li⁶⁴ reviewed his interesting experiences with 20 cases of perforation of typhoid ulceration of the intestine occurring in Hong Kong. Eighteen of the 20 patients recovered after simple closure of the perforation,

thorough evacuation of the peritoneal exudate and administration of chloramphenicol.

Biggs and coworkers¹³ reported on 279 consecutive civilian patients with injuries of the colon. Primary repair without colostomy was performed 220 times with a mortality rate of 5.5 per cent, as opposed to a mortality rate of 33 per cent in 52 cases in which a two-stage procedure was used. Primary repair is being used more frequently and the Biggs group said they considered it the method of choice. It should be pointed out, however, that it is possible there was some degree of selectivity which could have led to the large difference in mortality rate in the two types of therapy. Williams and Sargent¹²² in experimental studies on dogs showed that a shearing action between two opposing surfaces, rather than a bursting effect, is the primary cause of intestinal injury due to blunt abdominal trauma.

Cardiovascular System

As the techniques of vascular operations have progressively improved, interest in the management of vascular injuries has increased.^{10,50,97,99,103,105} Prompt recognition of the vascular injury is of the utmost importance to early repair. Beall and coworkers¹⁰ advocated immediate repair of traumatic arteriovenous fistulae rather than waiting the traditional long period for collateral circulation to develop. The same is true in the case of arteriovenous fistula resulting from lumbar-disc operations, as was pointed out by Spittell and associates.¹⁰³ These investigators also discussed the methods of prevention of this very serious complication of disc operations. It is generally agreed that if an autogenous artery cannot be utilized for repair of arterial injuries, autogenous vein grafts probably provide the best tissue for arterial substitution because of their ready availability, resistance to infection and greater flexibility at joints.⁵⁰ Extensive operative exposure may be required to provide adequate vascular control in injuries of the subclavian or axillary vessels.^{97,105} Splitting the sternum, clavicular resection and an incision into the third interspace may all be necessary to obtain a satisfactory operative exposure. Nabseth and Jones⁷⁵ reported loss of portions of the lower extremities after femoral venipuncture in seriously ill and dehydrated infants. Apparently gangrene of the lower extremities resulted from injury and consequent thrombosis of the femoral arteries. The authors suggested that the femoral vein not be utilized for withdrawal of blood in seriously ill infants.

Peripheral arterial embolism is discussed in detail by Young and his associates.¹²⁵ Perhaps the most significant contribution to the treatment of peripheral arterial embolization was made by Fogarty

and coworkers³² who advocated the use of a remarkably simple yet effective principle. Their method is based on introducing long slender catheters into the arterial system; then a very soft balloon is inflated at the tip, after which the catheter and large portions of clot are withdrawn by the balloon as gentle traction is applied to the catheter. I have used these instruments with great success, especially in late cases.

Intestinal complications of aortic disease or of aortic operations have become increasingly common. Garrett and coworkers³⁶ reported the occurrence of 15 aortoduodenal fistulae in 3,000 patients who underwent abdominal aortic resections. In two of these patients the fistula was primary and in the remainder it occurred after aortic operation. The most common preoperative diagnosis was bleeding duodenal ulcer. The usual site of aortic fistulization is the duodenum; the jejunum and ileum are involved less frequently, according to Humphries and coworkers.⁵⁴ These two groups as well as Tolstedt¹¹³ described methods of prevention of aortoduodenal fistula following aortic resection. The great importance of reperitonealization over the aortic homograft and possibly the interposition of omentum in this area was stressed. Thrombosis of the inferior mesenteric artery may occur spontaneously and cause infarction of the colon, or the thrombosis of the artery may be secondary to thrombus within an aortic aneurysm. More common than either of these mechanisms is the ligation of the inferior mesenteric artery during aortic resection in the presence of occlusive disease of the hypogastric vessels. Young and coworkers¹²⁶ described this complication and its clinical manifestations very well. Whenever it is known preoperatively that patients scheduled for aortic resection have severe occlusive disease of the hypogastric artery, intestinal antibiotics may be of some value. Ligation of the inferior mesenteric artery very close to the aorta to allow possible collateral flow through the left colic artery and its collateralization with the superior mesenteric vessels through the middle colic artery may be of great importance. In these circumstances the color and peristalsis of the colon must be observed very carefully.

The ever-increasing problem of sepsis as a complication of arterial reconstructive operations is discussed by Carter and coworkers²² and Shaw and Baue.⁹³ Carter and coworkers were able to effect healing in seven cases of infected synthetic prostheses. Shaw and Baue said that such a result almost never occurred in their patients, and that has been my experience. The infection does not subside until the graft is removed. The explanation for the disparity in results between these two groups is not readily apparent.

Beall and coworkers¹⁰ described the emergency nature of perforation of arteriosclerotic aneurysms into the inferior vena cava. The patient usually is first seen with signs of fulminating progressive congestive cardiac failure and cardiac embarrassment. Delaying treatment in attempts to improve the patient's preoperative condition is ill advised since only early operation will reverse the congestive heart failure. Fry and associates³⁴ showed in dogs that the hypotension which occurs after release of infrarenal aortic occlusion is due to reactive hyperemia and intravascular sequestration of significant portions of the total circulating blood volume into the lower extremities. They were able to prevent this problem with the use of regional vasopressor drugs; and they then applied this technique successfully in 15 clinical patients. Engler and coworkers³⁰ were able to prevent such hypotension by using a small arterial shunt around the aortic occlusion.

Hume and Porter⁵³ made a very strong case for early operation in patients with dissecting aneurysm of the aorta. Their position is based on studies that indicated an improved rate of survival following surgical therapy and the finding that the natural recovery rate from dissecting aneurysm is not nearly as high as the 20 to 25 per cent which has previously been reported.

Golding and associates³⁹ provided very strong evidence that sympathectomy produces earlier cessation of pain, diminution of edema, earlier and more distal demarcation, more rapid epithelization and an increased rate of healing in patients with frostbite. The results of this carefully done study should be heeded.

Haller and Abrams⁴² and Fogerty and coworkers³² showed very clearly the value of iliofemoral thrombectomy in the treatment of iliofemoral venous thrombosis. The rationale of this therapy is sound, in that it is intended to prevent destruction of the deep venous valves and consequent delayed post-phlebotic sequelae. The mortality and complication rates are low. The results are extremely encouraging, especially when the procedure is carried out within the first few days after thrombosis.

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REFERENCES

1. Akin, J. M., and Sullivan, M. B.: Pyloroplasty and vagotomy: Compromise procedure for control of acute peptic ulcer hemorrhage, *Surgery*, 54:587, 1963.
2. Albo, R., de Lorimier, A. A., and Silen, W.: Spontaneous rupture of the stomach in the adult, *Surgery*, 53:797, 1963.
3. Albo, R., Silen, W., and Goldman, L.: A critical clinical analysis of acute pancreatitis, *Arch. Surg.*, 86:1032, 1963.
4. Altemeier, W. A., and Todd, J.: Studies on the incidence of infection following open chest cardiac massage for cardiac arrest, *Ann. Surg.*, 158: 596, 1963.
5. Amerson, J. R., and Ferguson, I. A.: Traumatic hemobilia, *Surgery*, 54:729, 1963.
6. Baker, R. J., Dippel, W. F., Freeark, R. J., and Strohl, E. L.: The surgical significance of trauma to the pancreas, *Arch. Surg.*, 86:1038, 1963.
7. Baker, R. R.: Pulmonary embolism, *Surgery*, 54:687, 1963.
8. Baue, A. E., and Austen, W. G.: Superior mesenteric artery embolism, *Surg., Gynec. & Obstet.*, 116:474, 1963.
9. Beall, A. C., Jr., Cooley, D. A., Morris, G. C., Jr., and DeBakey, M. E.: Perforation of arteriosclerotic aneurysms into inferior vena cava, *Arch. Surg.*, 86:809, 1963.
10. Beall, A. C., Jr., Harrington, O. B., Crawford, E. S., and DeBakey, M. E.: Surgical management of traumatic arteriovenous aneurysms, *Am. J. Surg.*, 106:610, 1963.
11. Benson, C. D., Lloyd, J. R., and Fischer, H.: Intussusception in infants and children, *Arch. Surg.*, 86:745, 1963.
12. Bergentz, S. E., Gelin, L. E., Rudenstam, C. M., and Zederfeldt, B.: The viscosity of whole blood in trauma, *Acta Chir. Scand.*, 126:289, 1963.
13. Biggs, T. M., Beall, A. C., Jr., Gordon, W. B., Morris, G. C., Jr., and DeBakey, M. E.: Surgical management of civilian colon injuries, *J. Trauma*, 3:484, 1963.
14. Blomquist, H. E.: Acute obstruction of afferent loop following gastric resection A. M. Billroth II-Hofmeister, *Acta Chir. Scand.*, 126:92, 1963.
15. Boley, S. J., Schwartz, S., Lash, J., and Sternhill, V.: Reversible vascular occlusion of the colon, *Surg., Gynec. & Obstet.*, 116:53, 1963.
16. Boyan, C. P., and Howland, W. S.: Cardiac arrest and temperature of bank blood, *J.A.M.A.*, 183:58, 1963.
17. Brittain, R. S., and Earley, T. K.: Emergency thromboendarterectomy of the superior mesenteric artery: Report of four cases, *Ann. Surg.*, 158:138, 1963.
18. Britton, R. C., and Crile, G., Jr.: Late results of transesophageal suture of bleeding esophageal varices, *Surg. Gynec. & Obstet.*, 117:10, 1963.
19. Buetow, G. W., and Crampton, R. S.: Gallstone ileus. A report of 23 cases, *Arch. Surg.*, 86: 504, 1963.
20. Byrne, J. J., and Boyd, T. F.: Hyperamylasemia in intestinal obstruction and its relationship to pancreatitis, *Am. J. Surg.*, 105:720, 1963.
21. Cammock, E. E., Hallett, W. Y., Nyhus, L. M., and Harkins, H. N.: Diagnosis and therapy in gastrointestinal hemorrhage. A study of 410 patients, *Arch. Surg.*, 85:608, 1963.
22. Carter, S. C., Cohen, A., and Whelan, T. J.: Clinical experience with management of the infected dacron graft, *Ann. Surg.*, 158:249, 1963.
23. Cleveland, W. W., Chandler, J. R., and Lawson, R. B.: Treatment of caustic burns of the esophagus. Early esophagoscopy and adrenocortical steroids, *J.A.M.A.*, 186:262, 1963.
24. Cordonnier, J. K., and Izant, R. J.: Meconium ileus equivalent, *Surgery*, 54:667, 1963.
25. Cross, F. S., and Mowlem, A.: Pulmonary embolectomy utilizing cardiopulmonary bypass, *Surg., Gynec. & Obstet.*, 117:71, 1963.
26. Davis, C., Jr., Andresen, R., Akre, O., and McCarthy, W.: Spontaneous rupture of the stomach, *Arch. Surg.*, 86:170, 1963.
27. Desjardins, J. G., and Simpson, J. S.: Neonatal Hirschsprung's disease. Treatment of complete aganglionosis of the colon by the Duhamel operation, *Arch. Surg.*, 87:1019, 1963.
28. Donaldson, G. A., Williams, C., Schnnel, J. G., and Shaw, R. S.: A reappraisal of the application of the Trendelenburg operation to massive fatal embolism. Report of a successful pulmonary-artery thrombectomy using a cardiopulmonary bypass, *New Engl. J. Med.*, 268:171, 1963.
29. Doubilet, H., and Mulholland, J. H.: Some observations on the treatment of trauma to the pancreas, *Am. J. Surg.*, 105:741, 1963.

30. Engler, H. S., Ellison, L. T., Moretz, W. H., Simpson, J. G., Gleaton, H. E., and Freeman, R. A.: Shock following release of aortic cross-clamping. Its prevention by shunt, *Arch. Surg.*, 86:791, 1963.
31. Fogarty, T. J., Cranley, J. J., Krause, R. J., Strasser, E. S., and Hafner, C. D.: Surgical management of phlegmasia cerulea dolens, *Arch. Surg.*, 86:256, 1963.
32. Fogarty, T. J., Cranley, J. J., Krause, R. J., Strasser, E. S., and Hafner, C. D.: A method for extraction of arterial emboli and thrombi, *Surg., Gynec. & Obstet.*, 116:241, 1963.
33. Foster, J. H., Hickok, D. F., and Dunphy, J. E.: Factors influencing mortality following emergency operation for massive upper gastrointestinal hemorrhage, *Surg., Gynec. & Obstet.*, 117:257, 1963.
34. Fry, W. J., Keitzer, W. F., Kraft, R. O., and DeWeese, M. S.: Prevention of hypotension due to aortic release, *Surg., Gynec. & Obstet.*, 116:301, 1963.
35. Gambill, E. E., and Mason, H. L.: One-hour value for urinary amylase in 96 patients with pancreatitis, *J.A.M.A.*, 186:24, 1963.
36. Garrett, H. E., Beall, A. C., Jr., Jordan, G. L., Jr., and DeBakey, M. E.: Surgical considerations of massive gastrointestinal tract hemorrhage caused by aortoduodenal fistula, *Am. J. Surg.*, 105:6, 1963.
37. Gettler, D. T., and Allbritten, F. F., Jr.: Effect of alcohol intoxication on the respiratory exchange and mortality rate associated with acute hemorrhage in anesthetized dogs, *Ann. Surg.*, 158:151, 1963.
38. Goetz, R. H., Selmonosky, C. A., and State, D.: The effect of the amine buffer Tris (hydroxymethyl) amino methane (Tham) on the renal blood flow during hemorrhagic shock, *Surg., Gynec. & Obstet.*, 117:715, 1963.
39. Golding, M. R., Dejong, P., Sawyer, P. N., Hennigar, G. R., and Wesolowski, S. A.: Protection from early and late sequelae of frostbite by regional sympathectomy: mechanism of "cold sensitivity" following frostbite, *Surgery*, 53:303, 1963.
40. Graff, R. J.: Considerations in the treatment of traumatic hemobilia, *Am. J. Surg.*, 105:662, 1963.
41. Haber, M. H., Brown, W. T., and Schneider, K. A.: Ischemic necrosis of multiple organs in prolonged shock, *J.A.M.A.*, 183:1107, 1963.
42. Haller, J. A., Jr., and Abrams, B. L.: Use of thrombectomy in the treatment of acute iliofemoral venous thrombosis in forty-five patients, *Ann. Surg.*, 159:561, 1963.
43. Hallin, R. W.: Continuous venous pressure monitoring as a guide to fluid administration in the hypotensive patient, *Am. J. Surg.*, 106:164, 1963.
44. Handelsman, J. C., Abrams, S., and Corry, R. J.: Improvement of therapy for congenital jejunoileal atresia, *Surg., Gynec. & Obstet.*, 117:691, 1963.
45. Hardaway, R. M., and McKay, D. G.: The syndromes of disseminated intravascular coagulation, *Rev. Surg.*, 20:297, 1963.
46. Harvey, H. D.: Emergency gastric resection for bleeding and perforation, *Arch. Surg.*, 86:557, 1963.
47. Hayasaka, H., and Howard, J. M.: Mechanism of action of D-Aldosterone in endotoxin shock, *Surgery*, 54:761, 1963.
48. Hays, D. M., and Snyder, W. H., Jr.: Results of conventional operative procedures for esophageal atresia in premature infants, *Am. J. Surg.*, 106:19, 1963.
49. Henelt, E. R., Smith, S. E., and Dodds, M. E.: Pneumogastrography in perforated gastroduodenal ulcers, *Am. J. Surg.*, 106:491, 1963.
50. Hershey, F. B., and Spencer, A. D.: Autogenous vein grafts for repair of arterial injuries, *Arch. Surg.*, 86:836, 1963.
51. Hickey, R. C., Tidrick, R. T., and Layton, J. M.: Fulminating ulcerative colitis with colonic wall necrosis, *Arch. Surg.*, 86:764, 1963.
52. Howard, J. M., and Singh, L. M.: Peritoneal fluid pH after perforation of peptic ulcers. The myth of "acid-peritonitis," *Arch. Surg.*, 87:483, 1963.
53. Hume, D. M., and Porter, R. R.: Acute dissecting aortic aneurysms, *Surgery*, 53:122, 1963.
54. Humphries, A. W., Young, J. R., DeWolfe, V. G., and LeFevre, F. A.: Complications of abdominal aortic surgery. I. Aortoenteric fistula, *Arch. Surg.*, 86:43, 1963.
55. Jones, S. A., and Joergenson, E. J.: Closure of duodenal wall defects, *Surgery*, 53:438, 1963.
56. Jordan, G. L., Jr., DeBakey, M. E., and Cooley, D. A.: The role of resective therapy in the management of acute gastroduodenal perforation, *Am. J. Surg.*, 105:396, 1963.
57. Knott, D. H., Barlow, G., and Beard, J. D.: Effects of alcohol ingestion on the production of and response to experimental hemorrhagic stress, *New Engl. J. Med.*, 269, 1963.
58. Kozoll, D. D., and Meyer, K. A.: Laboratory findings in massively bleeding gastroduodenal ulcers, *Arch. Surg.*, 87:916, 1963.
59. Kozoll, D. D., and Meyer, K. A.: Massively bleeding gastroduodenal ulcers. General factors influencing incidence and mortality, *Arch. Surg.*, 86:445, 1963.
60. Kozoll, D. D., and Meyer, K. A.: Symptoms and signs in the prognosis of massively bleeding gastroduodenal ulcer, *Am. J. Surg.*, 106:879, 1963.
61. Kyle, J., Steyn, J. H., Bell, T. M., and Mercer, S.: Acute recurrent intussusception, *Surg., Gynec. & Obstet.*, 117:323, 1963.
62. Laufman, H., Nora, P. F., and Bahuth, J. J.: Limited usefulness of serum lactic dehydrogenase activity as a test for strangulation obstruction, *Am. J. Surg.*, 105:233, 1963.
63. Lepley, D., Jr., Weisfeldt, M., Close, A. S., Schmidt, R., Bowler, J., Kory, R. C., and Ellison, E. H.: Effect of low molecular weight dextran on hemorrhagic shock, *Surgery*, 54:93, 1963.
64. Li, F. W. P.: Surgical treatment of typhoid perforation of the intestine, *Brit. J. Surg.*, 50:976, 1963.
65. Lister, J., McNeill, I. F., Marshall, V. C., Plzak, L. F., Dagher, F. J., and Moore, F. D.: Transcapillary refilling after hemorrhage in normal man: Basal rates and volumes; effect of norepinephrine, *Ann. Surg.*, 158:698, 1963.
66. Marston, A.: Causes of death in mesenteric arterial occlusion: I. Local and general effects of devascularization of the bowel, *Ann. Surg.*, 158:952, 1963.
67. Marston, A.: Causes of death in mesenteric arterial occlusion: II. Observations of revascularization of the ischemic bowel, *Ann. Surg.*, 158:960, 1963.
68. Mason, J. H., Roberts, S. S., and Hunter, J. A.: Malrotation in the newborn period with jaundice, *Am. J. Surg.*, 106:986, 1963.
69. McCabe, R., and Knox, W. G.: Phytobezoar in gastrectomized patients. A cause of small bowel obstruction, *Arch. Surg.*, 86:264, 1963.
70. McCutcheon, A. D., and Race, D.: Experimental pancreatitis: Use of a new antiproteolytic substance, Trasylol, *Ann. Surg.*, 158:233, 1963.
71. McGowan, G. K., and Walters, G.: The value of measuring central venous pressure in shock, *Brit. J. Surg.*, 50:821, 1963.
72. Merendino, K. A., Dillard, D. H., and Cammock, E. E.: The concept of surgical biliary decompression in the management of liver trauma, *Surg., Gynec. & Obstet.*, 117:285, 1963.
73. Miller, R. E., Moscarella, A. A., and Fitzpatrick, H. F.: Local gastric hypothermia, *Arch. Surg.*, 86:272, 1963.
74. Moore, T. C., and Baker, W. H.: Operative and radiologic relief of gallstone intestinal obstruction, *Surg., Gynec. & Obstet.*, 116:189, 1963.
75. Nabseth, D. C., and Jones, J. E.: Gangrene of the lower extremities of infants after femoral venipuncture. Report of two cases, *New Engl. J. Med.*, 268:1003, 1963.
76. Nassif, A. C., Nolan, T. R., and Corcoran, A. C.: Angiotensin II in treatment of hypotensive states, *J.A.M.A.*, 183:751, 1963.
77. Nelson, R. M., Poulson, A. M., Lyman, J. H., and Henry, J. W.: Evaluation of tris (hydroxymethyl) aminomethane (THAM) in experimental hemorrhagic shock, *Surgery*, 54:86, 1963.

78. Nemir, P., Hoferichter, J., and Drabkin, D. L.: The protective effect of proteinase inhibitor in acute necrotizing pancreatitis, *Ann. Surg.*, 158:655, 1963.
79. Orloff, M. J., and Thomas, H. S.: Pathogenesis of esophageal varix rupture. A study based on gross and microscopic examination of the esophagus at the time of bleeding, *Arch. Surg.*, 87:301, 1963.
80. Palmerio, C., Zetterstrom, B., Shammash, J., Euchbaum, E., Frank, E., and Fine, J.: Denervation of the abdominal viscera for the treatment of traumatic shock, *New Engl. J. Med.*, 269:709, 1963.
81. Peck, D. A., Lynn, H. B., and DuShane, J. W.: Intussusception in children, *Surg., Gynec. & Obstet.*, 116:398, 1963.
82. Poulos, E.: Hepatic resection for massive liver injuries, *Ann. Surg.*, 157:525, 1963.
83. Richardson, W. R.: The role and management of enterostomy in intestinal obstruction in infants, *Am. J. Surg.*, 106:581, 1963.
84. Robb, H. J.: The role of micro-embolism in the production of irreversible shock, *Ann. Surg.*, 158:685, 1963.
85. Rothwell-Jackson, R. L.: Idiopathic large-bowel obstruction, *Brit. J. Surg.*, 50:797, 1963.
86. Royster, H. P., Harrison, J. M., and Martin, C. J.: Acute perforated peptic ulcer. Treatment by primary definitive surgery, *Arch. Surg.*, 86:230, 1963.
87. Saidi, F., and Donaldson, G. A.: Acute pancreatitis following distal gastrectomy for benign ulcer, *Am. J. Surg.*, 105:87, 1963.
88. Samueloff, S. L., Luttwak, E. M., and Wigderhouse, B. M.: Acid-base balance changes in citrated bank blood, *Arch. Surg.*, 87:1029, 1963.
89. Santschi, D. R., Huizenga, K. A., Scudamore, H. H., Dearing, W. H., and Waugh, J. M.: Bile ascites, *Arch. Surg.*, 87:851, 1963.
90. Sautter, R. D., Lawton, B. R., Magnin, G. E., and Emanuel, D. A.: Pulmonary embolectomy. Report of a case with preoperative and postoperative angiograms, *New Engl. J. Med.*, 269:997, 1963.
91. Schumer, W., and Durrani, K. M.: Study of effects of norepinephrine on microcirculation of the dog omentum in oligemic shock, *Ann. Surg.*, 158:982, 1963.
92. Shaftan, G. W., Gliedman, M. L. and Cappelletti, R. R.: Injuries of the liver: A review of 111 cases, *J. Trauma*, 3:63, 1963.
93. Shaw, R. S., and Baue, A. E.: Management of sepsis complicating arterial reconstructive surgery, *Surgery*, 53:75, 1963.
94. Shinowara, G. Y., Stutman, L. J., Walters, M. I., Ruth, M. E., and Walker, E. J.: Hypercoagulability in acute pancreatitis, *Am. J. Surg.*, 105:714, 1963.
95. Sieber, W. K., and Girdany, B. R.: Functional intestinal obstruction in newborn infants with morphologically normal gastrointestinal tracts, *Surgery*, 53:357, 1963.
96. Simeone, F. A.: Shock, trauma and the surgeon, *Ann. Surg.*, 158:759, 1963.
97. Smith, L. L., Foran, R., and Gaspar, M. R.: Acute arterial injuries of the upper extremity, *Am. J. Surg.*, 106:144, 1963.
98. Smith, R. B., Orahod, R. C., Wangenstein, S. L., Berakha, G. J., and Zamelis, A.: Effect of a trypsin-inhibitor on experimentally induced pancreatitis in the dog, *Surgery*, 54:922, 1963.
99. Smith, R. F., Szilagyi, D. E., and Pfeifer, J. R.: Arterial trauma, *Arch. Surg.*, 86:825, 1963.
100. Solheim, K.: Acute intestinal infarction: Acute mesenteric vascular occlusion, *Acta Chir. Scand.*, 126:133, 1963.
101. Souliotis, P. T., Pettgrew, A. H., and Chamberlain, J. W.: Traumatic hemobilia, *New Engl. J. Med.*, 268:565, 1963.
102. Spencer, F. C., Menguy, R., and Eiseman, B.: Operative cholangiography in management of traumatic hemobilia, *Surgery*, 54:376, 1963.
103. Spittell, J. A., Jr., Palumbo, P. J., Love, J. G., and Ellis, F. H., Jr.: Arteriovenous fistula complicating lumbar-disk surgery, *New Engl. J. Med.*, 268:1162, 1963.
104. Starzl, T. E., and Sanders, R. J.: A maneuver for detection of the site of gastric hemorrhage, *Surg., Gynec. & Obstet.*, 116:121, 1963.
105. Steenburg, R. W., and Ravitch, M. M.: Cervico-thoracic approach for subclavian vessel injury from compound fracture of the clavicle: Considerations of subclavian-axillary exposures, *Ann. Surg.*, 157:839, 1963.
106. Stoney, W. S., Jr., Jacobs, J. K., and Collins, H. A.: Pulmonary embolism and embolectomy, *Surg., Gynec. & Obstet.*, 116:292, 1963.
107. Strahan, R. W., Sajedee, M., and DuVal, M. K.: The leaking esophageal suture line. A new method of repair using Eastman 910 adhesive, *Am. J. Surg.*, 106:570, 1963.
108. Thal, A. P., Kobold, E. E., and Hollenberg, M. J.: The release of vasoactive substances in acute pancreatitis, *Am. J. Surg.*, 105:708, 1963.
109. Thaler, M. M., and Stobie, G. H.: An improved technique of external cardiac compression in infants and young children, *New Engl. J. Med.*, 269:606, 1963.
110. Thompson, B. W., and Lipin, R. J.: Propylthiouracil in hemorrhagic pancreatitis, *Arch. Surg.*, 86:243, 1963.
111. Thompson, N. W.: Ischemic necrosis of proximal gastric remnant following subtotal gastrectomy, *Surgery*, 54:434, 1963.
112. Thoren, L.: Bile peritonitis, II. Experimental studies of plasma volume loss, haptoglobin concentration in serum and kidney lesions in bile peritonitis, *Acta Chir. Scand.*, 126:114, 1963.
113. Tolstedt, G. E., Jesseph, J. E., and Bell, J. W.: Late intestinal complications of abdominal aortic homografts, *Surg., Gynec. & Obstet.*, 116:42, 1963.
114. Turner, G. R., Hinshaw, D. B., Carter, R., and Vannix, R. S.: Local gastric hypothermia in management of massive upper gastrointestinal hemorrhage, *Surgery*, 53:609, 1963.
115. Tuttle, W. M., and Barrett, R. J.: Late esophageal perforations, *Arch. Surg.*, 86:695, 1963.
116. Vick, J. A., LaFave, J. W., and MacLean, L. D.: Effect of treatment of endotoxin shock on renal hemodynamics and survival, *Surgery*, 54:78, 1963.
117. Waldhausen, J. A., Herendeen, T., and King, H.: Necrotizing colitis of the newborn: Common cause of perforation of the colon, *Surgery*, 54:365, 1964.
118. Wangenstein, S. L., Orahod, R. C., Voorhees, A. B., Smith, R. B., III, and Healey, W. V.: Intragastric cooling in the management of hemorrhage from the upper gastrointestinal tract, *Am. J. Surg.*, 105:401, 1963.
119. Whitcomb, J. G., Bromme, D. A., and Lovelace, W. R.: Barium enema reduction of gallstone ileus, *Am. J. Surg.*, 106:592, 1963.
120. Wilder, R. J., Weir, D., Rush, B. F., and Ravitch, M. M.: Methods of coordinating ventilation and closed chest cardiac massage in the dog, *Surgery*, 53:186, 1963.
121. Williams, J. R., Wilcox, W. C., Andrews, G. J., and Burns, R. R.: Angiography in pulmonary embolism, *J.A.M.A.*, 184:473, 1963.
122. Williams, R. D., and Sargent, F. T.: The mechanism of intestinal injury in trauma, *J. Trauma*, 3:288, 1963.
123. Wolfman, E. F., Jr., Neill, S. A., Heaps, D. K., and Zuidema, G. D.: Donor blood and isotonic salt solution. Effect on survival after hemorrhagic shock and operation, *Arch. Surg.*, 86:869, 1963.
124. Yanoff, M.: Incidence of bone-marrow embolism due to closed-chest cardiac massage, *New Engl. J. Med.*, 269:837, 1963.
125. Young, J. R., Humphries, A. W., DeWolfe, V. G., and LeFevre, F. A.: Peripheral arterial embolism, *J.A.M.A.*, 185:621, 1963.
126. Young, J. R., Humphries, A. W., DeWolfe, V. G., and LeFevre, F. A.: Complications of abdominal aortic surgery. II. Intestinal ischemia, *Arch. Surg.*, 86:51, 1963.